

# Thick Film Chip Resistor

## Anti-Surge Lead (Pb) Free

CRSWG Series

**MERITEK**

### FEATURE

- High Power Rating
- Improved Working Voltage Ratings
- Excellent surge withstanding & pulse withstanding performance
- Lead (Pb) Free, Green type
- Application: Metering, Medical Devices, Automotive, Power Supply, Charger, Inverter, LCD Video Monitors
- AEC-Q200 qualified



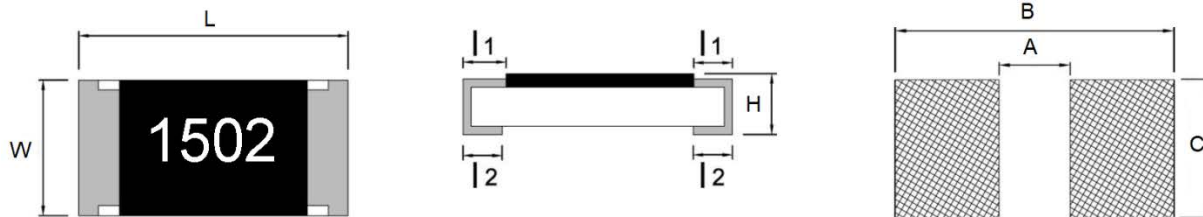
### PART NUMBERING SYSTEM

CRSWG    10    V    1002    F    13  
 (1)        (2)        (3)        (4)        (5)        (6)



No	Item	Code	Description	
(1)	Meritek Series	CRSWG	Thick Film Chip Resistor series, Anti-Surge AEC-Q200 Lead (Pb) Free Type	
(2)	Size Code	10	10:0805	01: 2512, 02: 2010, 04: 1210 08: 1206, 16: 0603, 20: 0402
(3)	Power Rating	V	V: 0.25W	X: 0.10W, W: 0.125W, O: 0.33W, G: 0.4W, U: 0.5W, Q: 0.75, T: 1W, S: 2W
(4)	Resistance	1002	1002: 10KΩ	First two digits: significant, Third: Multiplier First three digits: significant, Fourth: Multiplier
(5)	Tolerance	F	F:±1%	G: ±2%, J: ±5%, K: ±10%, M: ±20%, N: ±30%
(6)	Packaging	13	13:13" reel	Blank: Standard 7" reel

### DIMENSIONS



Size	L	W	H	I1	I2	A	B	C
0402	1.00 ± 0.10	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10	0.60	1.60	0.70
0603	1.60 ± 0.20	0.80 ± 0.15	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10	0.80	2.40	1.00
0805	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15	1.30	2.90	1.40
1206	3.05 ± 0.10	1.60 ± 0.20	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20	2.20	4.20	1.70
1210	3.05 ± 0.10	2.50 ± 0.20	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20	2.00	4.40	2.70
2010	5.00 ± 0.20	2.50 ± 0.20	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20	3.80	6.60	2.70
2512	6.30 ± 0.20	3.20 ± 0.20	0.68 ± 0.10	0.60 ± 0.20	0.60 ± 0.20	4.90	8.10	3.40

Unit: mm

# Thick Film Chip Resistor

## Anti-Surge Lead (Pb) Free

CRSWG Series

**MERITEK**

### ELECTRICAL CHARACTERISTICS

#### STANDARD TYPE

Size	Rated Power (W), 70°C	Rated Voltage (V) Max	Overload Voltage (V) Max	TCR (PPM/°C)	Resistance Range		
					±1%, ±2%	±5%, ±10%	±20%, ±30%
					(Ω)	(Ω)	
0402	0.1	50	100	±400	--	1≤R<10	
				±250	10≤R<100K	10≤R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
0603	0.125	150	200	±400	--	1≤R≤10	
				±250	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
0805	0.25	150	300	±400	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
1206	0.33	200	400	±400	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
1210	0.5	200	400	±400	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
2010	0.75	400	800	±400	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
2512	1.50	500	1000	±400	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	

#### HIGH POWER RATING TYPE

Size	Rated Power (W), 70°C	Rated Voltage (V) Max	Overload Voltage (V) Max	TCR (PPM/°C)	Resistance Range		
					±1%, ±2%	±5%, ±10%	±20%, ±30%
					(Ω)	(Ω)	
0402	0.125	50	100	±400	--	1≤R<10	
				±250	10≤R<100K	10≤R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
0603	0.25	150	200	±100	--	1≤R≤10	
				±250	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
0805	0.40	150	300	±100	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
1206	0.50	200	400	±100	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
1210	0.75	200	400	±100	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
2010	1.0	400	800	±100	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	
2512	2.0	500	1000	±100	--	1≤R≤10	
				±200	10<R<100K	10<R<100K	
				±100	100K≤R≤1M	100K≤R≤10M	

Notes: For non-standard parts, please contact our sales dept. Operating Temperature Range : -55°C ~ +155°C

# Thick Film Chip Resistor Anti-Surge Lead (Pb) Free

CRSWG Series

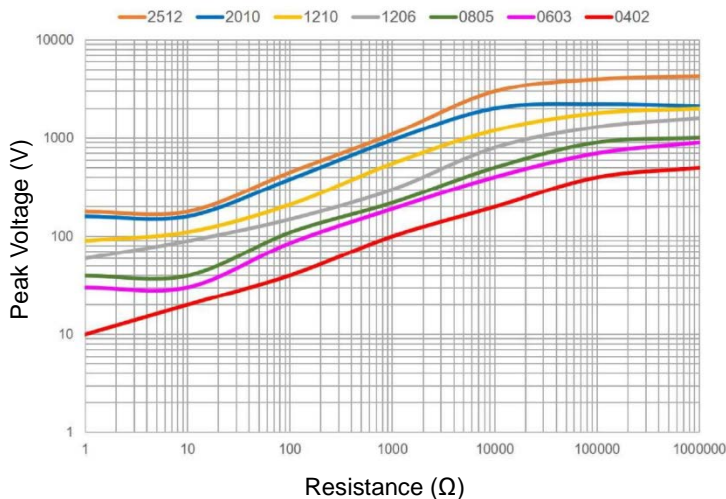
**MERITEK**

## RELIABILITY TEST CONDITION AND REQUIREMENT

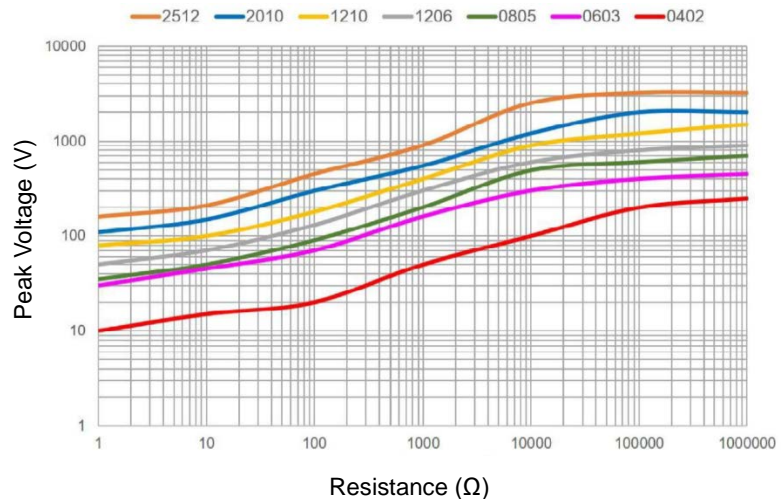
Item	Standard	Condition	Requirement
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25 / -55°C and 25°C /+155°C, 25°C is the reference temperature	As Specified
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2. 5 times RCWV or Max. Overload voltage whichever is less for 5 sec.	±(1.0%+0.05Ω)
Single Pulse High Voltage Overload	IEC-60115	Severity No. 4: $U=10\sqrt{P_{70} \times R}$ or $U=2 \times U_{MAX}$ , whichever is the less severe. One pulse per minute, 10 pulses 10/700us	±(1.0%+0.05Ω)
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	Individual leaching area ≤5% Total leaching area ≤10%
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	±(1.0%+0.05Ω)
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	≥ 10GΩ
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	5 Cycles (-55°C to +155°C)	±(1.0%+0.10Ω)
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor is immersed into isopropyl alcohol of 20~25°C for 60 sec. Leave to rest at room temp for 48 hrs.	±(0.5%+0.05Ω)
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40±2°C, 90~95% R.H. RCWV or Max. working voltage whichever is less for 1000hrs with 1.5hrs "ON" and 0.5hr "OFF"	±(2.0%+0.05Ω)
Load Life	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2°C, RCWV or Max. working voltage whichever is less for 1000hrs with 1.5hrs "ON" and 0.5hr "OFF"	±(3.0%+0.10Ω)
Board Flex	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds 0402/0603/0805: 5mm; 1206/1210/1812: 3mm; 2010/2512 sizes: 2mm	±(1.0%+0.05Ω)

## CHARACTERISTIC CURVE LIGHTNING SURGE

1.2/50us Lightning Surge



10/700us Lightning Surge



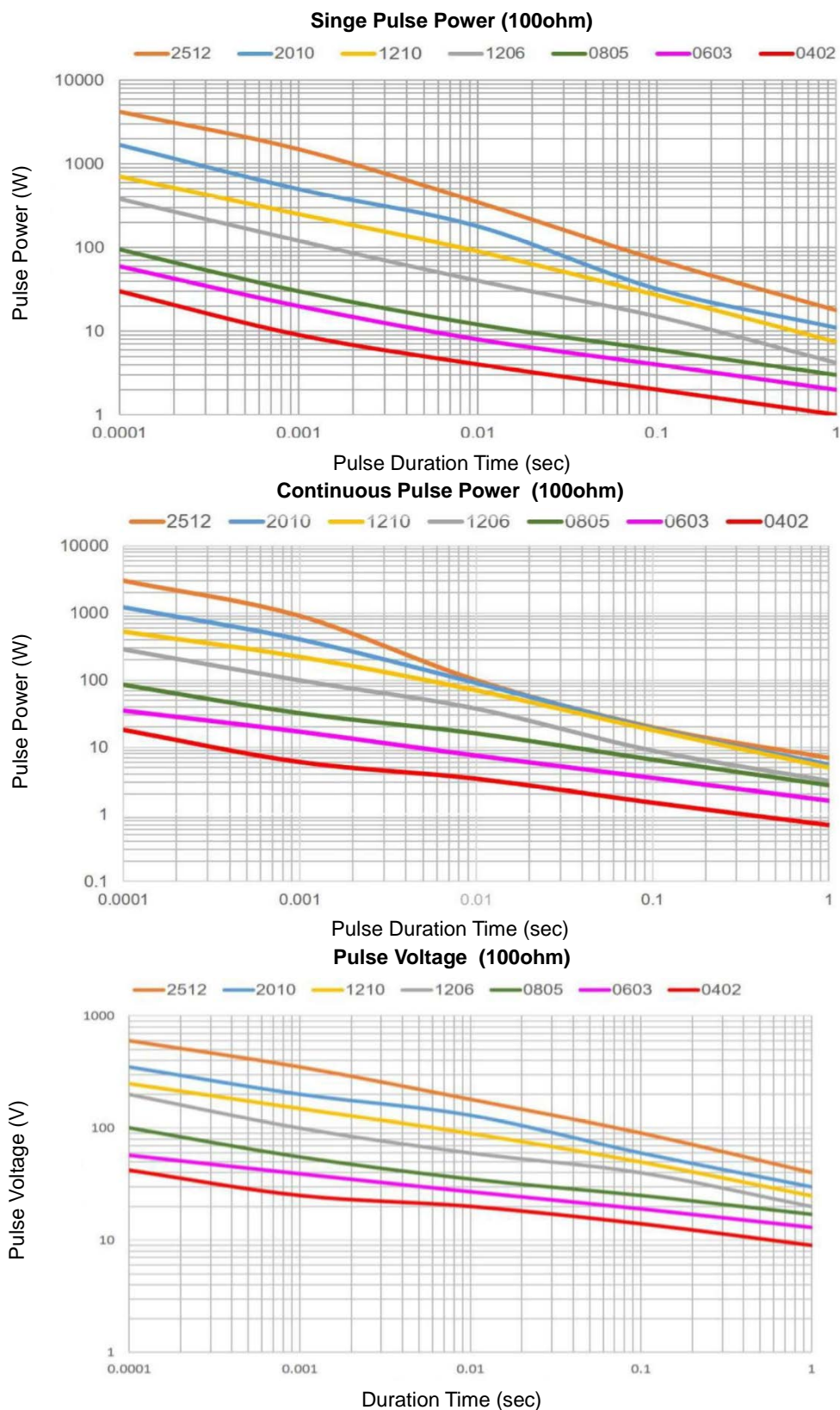
# Thick Film Chip Resistor

## Anti-Surge Lead (Pb) Free

CRSWG Series

MERITEK

### CHARACTERISTIC CURVE



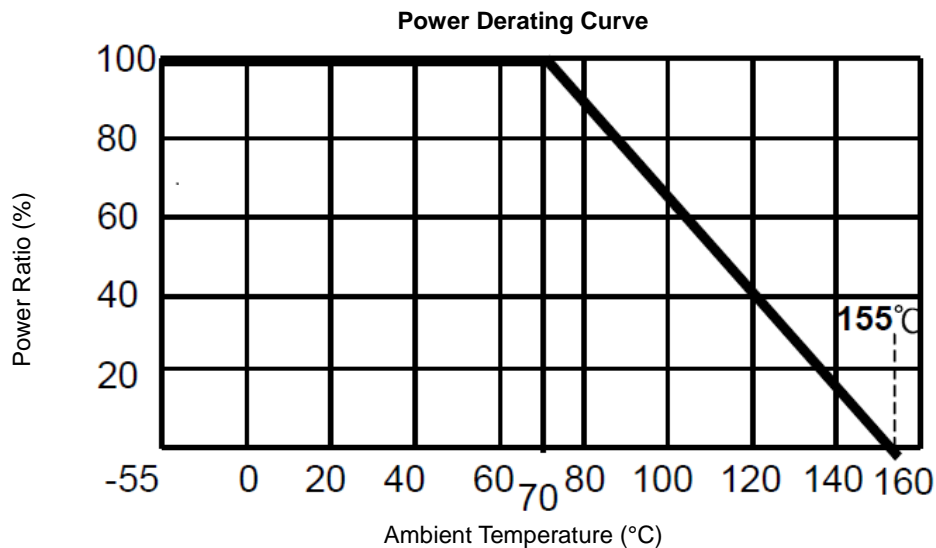
# Thick Film Chip Resistor

## Anti-Surge Lead (Pb) Free

CRSWG Series

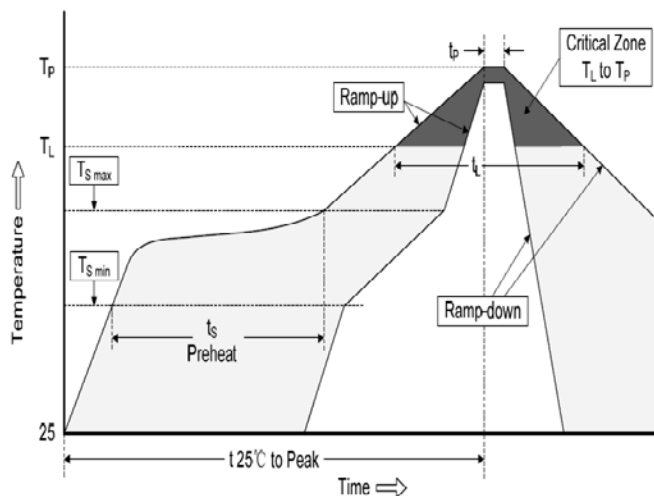
**MERITEK**

### POWER DERATING CURVE



### SOLDERING RECOMMENDATION

Reflow Condition		
Pre Heat	Temp. Min $T_{s(min)}$	150°C
	Temp. Max $T_{s(max)}$	180°C
	Time (min. to max.) ( $t_s$ )	90s ~ 120s
Average ramp up rate ( $T_L$ ) to peak		3°C/s max.
$T_{s(max)}$ to $T_L$ (Ramp-up rate)		3°C/s max.
Reflow	Temp. ( $T_L$ )	220°C
	Time (min. to max.) ( $t_L$ )	60s max.
Peak Temperature ( $T_P$ )		265°C
Time within 5°C of $T_P$ ( $t_p$ )		10s
Ramp-down Rate		6°C/s



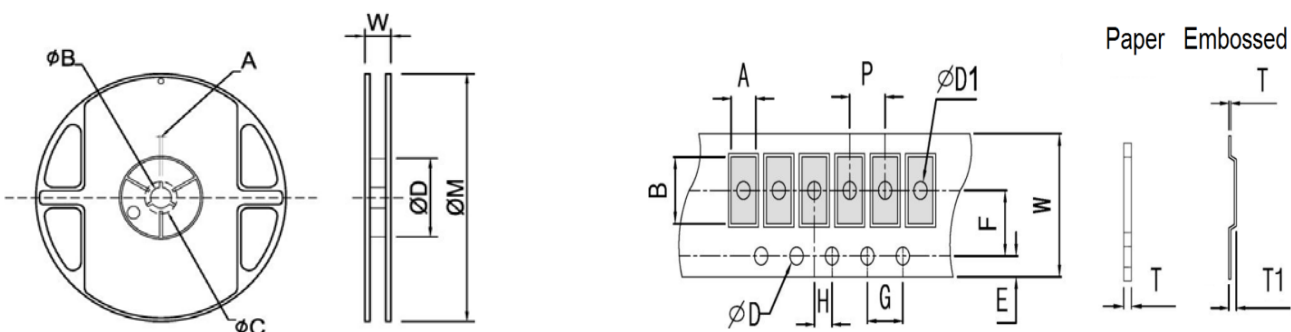
# Thick Film Chip Resistor

## Anti-Surge Lead (Pb) Free

CRSWG Series

**MERITEK**

### PACKAGING SPECIFICATIONS



Size	Reel Dimension (mm)								
	Type	Quantity	Reel Diameter	A ±0.5	φB ±1.0	φC ±1.0	φD ±1.0	W ±2.0	φM ±2.0
0402	Paper	10K	7"	2.0	13.5	21	60	11.5	178
	Paper	40K/50K	13"	2.0	13.5	21	100	11.5	330
0603 0805 1206	Paper	5K	7"	2.0	13.5	21	60	11.5	178
	Paper	10K	10"	2.0	13.5	21	100	11.5	254
	Paper	20K	13"	2.0	13.5	21	100	11.5	330
1210	Paper	5K	7"	2.0	13.5	21	60	11.5	178
2010	Plastic	4K	7"	2.0	13.5	21	60	16.0	178
2512	Plastic	4K	7"	2.0	13.5	21	60	16.0	178

Size	Tape Dimension (mm)												Type
	A	B	W ±0.2	E ±0.10	F ±0.05	G ±0.10	H ±0.05	T ±0.10	φD <sub>0</sub> ±0.05	φD <sub>1</sub> ±0.1	T <sub>1</sub> ±0.15	P ±0.10	
0402	0.70±0.10	1.20±0.10	8.00	1.75	3.50	4.00	2.00	0.45	1.55	--	--	2.00	Paper
0603	1.05±0.20	1.80±0.20	8.00	1.75	3.50	4.00	2.00	0.60	1.55	--	--	4.00	Paper
0805	1.55±0.20	2.30±0.20	8.00	1.75	3.50	4.00	2.00	0.75	1.55	--	--	4.00	Paper
1206	1.90±0.20	3.50±0.20	8.00	1.75	3.50	4.00	2.00	0.75	1.55	--	--	4.00	Paper
1210	2.85±0.20	3.50±0.20	8.00	1.75	3.50	4.00	2.00	0.75	1.55	--	--	4.00	Paper
2010	2.80±0.20	5.60±0.20	12.0	1.75	5.50	4.0	2.0	0.23	1.55	1.50	0.85	4.00	Plastic
2512	3.40±0.20	6.70±0.20	12.0	1.75	5.50	4.0	2.0	0.23	1.55	1.50	0.85	4.00	Plastic

\*Specifications subject to change without notice.